

Wet, wet Wet

In the past drainage on the golf course tended to rely heavily on agricultural practice, but the drainage needs of agricultural land is different from that required for a golf course and this is now recognised. Basically the golf course needs much faster response with rain required to be removed from the playing surface almost as fast as it falls, leaving minimal surface water, even after (or during) heavy rainfall – and this is particularly true for greens.

As any greenkeeper knows the demand is now for courses that are playable virtually all year round – and waterlogging is not acceptable. However, for the greenkeeper perhaps it is more important to know, and act on, the fact that waterlogged soil is detrimental to grass growth – and although most grasses are remarkably tolerant, you can be sure that waterlogging will discourage preferred species to the benefit of weeds and weed species.

While new courses are mostly designed with comprehensive built-in drainage there are many older courses and some 'farmer built' courses which have inadequate drainage, furthermore there are some new courses where drainage has been inadequate or has failed, often because of settling of landscaped features. In the view of Nigel Wyatt, of M J Abbott, one of the leaders in sports turf drainage, it is vital that the main skeletal drainage system should be in place early on in construction or upgrading. In other words that main streams, culverts and drains be put in before features, greens, bunkers and other details are installed. This can allow for a secondary phase of drainage once greens and features have settled and there has been a chance to see how the water runs. Putting in a skeletal system ensures that later work is undertaken to fixed reference points.

Retrospective installation and remedial work tends to be both disruptive to golf and considerably more expensive, however, Nigel

maintains that with proper planning and the right machinery disruption can be minimised, and justified by subsequent benefits.

Many modern courses have USGA specification greens with intensive underground pipe drains under geo-textile, a stone carpet and a sand base ensuring that water drains through very quickly. Fairways may be less intensively drained or even not drained at all but landscaped to give natural runoff while bunkers are likely to get individual treatment with specific drainage under the sand to a convenient ditch or main drain. Nigel commented that care is necessary to ensure that the bottoms of bunkers are higher than the point to which they must drain. Typically, main drains are put in at 900mm plus deep while the laterals which feed into them are likely to be from 600 mm deep with stone back-fill above them to within perhaps 150mm of ground level. At this depth the drain itself is unlikely to be damaged by mechanical aeration however such aeration is expected to encroach and cross the gravel layer to provide water channels to the drain from the surrounding area. Good aeration should fracture the soil so that water can drain laterally.

Only so much water can be removed from any area unless there is an effective system for getting it to a stream or storage and perhaps this is where the expertise of the specialist is most important.

The least expensive means of moving water may be via an open ditch or stream, however, these do need subsequent maintenance, furthermore there are limitations to their routing – water won't run up hill! So in some cases deep pipes may have to be laid. An alternative is to flow into a series of lakes, nevertheless spillway provisions will be necessary to take any surplus water away.

Following several dry summers there is growing demand for irrigation and the trend, with pressure

from the environmental agency (and others), is for golf clubs to store surplus rainfall for summer use. Such lakes are likely to make ideal course features nor are streams unacceptable to players, but considerable fore thought may be needed over siting. Empty lakes – after the water has been irrigated – cause comment and are not attractive, so it may be better to site the reservoir – of surplus water – safely off course, and securely fenced. If you drain into an existing water course this will not give you a right to extract from it later, although it may be possible to get permission to build a dam. Again the specialists know the answers. Tax implications can be extremely complex and inevitably require involvement of the club's own tax adviser. Certainly drainage, irrigation and water storage are major capital expenses which need prior consideration for their tax – and VAT implications. Getting advice to write in this feature quickly led to the conclusion that it needed thousands more words and still would not be comprehensive for all the tax positions of all clubs. In any case few greenkeepers wish to understand the complexities of tax – that can be left to secretaries.

Some areas of the country are (perhaps) blessed by having naturally draining soil and subsoil – and a sufficiently low water table to take the water away, however, there are many areas, such as London, Oxford and other clays which drain reluctantly, for these more active measures are needed. There are also areas where the underlying rock prevents water percolating away and others where the soil is easily panned so that it becomes impervious – and even those with a chalk or limestone base can find themselves in this position.

Although some clubs do undertake some drainage work themselves, more particularly cleaning out streams and water channels, the majority depend on specialist



contractors of whom there are several who specialise in sports ground and golf course work. The two most notable names have many years of experience having graduated from agricultural to turf drainage and developed specialist divisions.

There is a belief held by many that drainage once installed can be forgotten – this is a myth, drains do have a finite life. This life may be extended by regular maintenance, so it makes sense to inspect and review the workings of the whole system on a regular basis and to undertake remedial work at the first sign of deterioration.

Modern under drainage utilises mostly corrugated plastic pipe with slots through which the water percolates, the diameter of these pipes depending upon the water flow anticipated. Obviously it is vital to ensure that water can get easily and quickly to these pipes, which is why they are usually laid under a stone bed and sand, or if trenched into tees or fairways with the trench back filled with stone or gravel and sand. Nor should the use of geotextile be forgotten in the design as this is another way in which the drainage pipe can be protected against blocking or silting – silting is caused by finer sediment settling and building up where there is insufficient flow to discharge them downstream.

Other techniques which can be



used mainly to augment piped drainage are 'slitting' and 'sand banding'. Such methods are ideal to remove water from specific spots, furthermore they can be used to intercept water, such as from a spring, and channel it to a drain.

While slitting and sand banding are within the capability of greenkeeper most still prefer to employ a contractor. This saves capital expenditure and should take away any measure of uncertainty from the task. In simple terms it is just a matter of cutting a slot or trench and filling it with stone and/or sand. Unless there are significant variations in level the grade or fall for this is seldom vital - and the operation can be carried out by eye, in any case runs are usually short.

Under drains are generally closer spaced on a golf course in comparison to agriculture and often augmented by sand banding or slit trenches running across and over the drainage pipes.

Of course, aeration carried out regularly on a golf course contributes to drainage and soil water mobility, but to be effective for drainage, aeration needs to be carried out while the soil is relatively dry. Nevertheless aeration holes can be used in some cases to remove water from the surface - and particularly to get it through a compacted layer.

Another option to gravel bands or sand slits is to use an artificial medium such as the Hydray fin drain which comprises of a plastic core covered by geo-textile. This more expensive option may have better water conductivity, however, it is prone to mechanical damage so care is essential when aerating.

With agricultural under drainage mole ploughing is a vital and intrinsic part of most schemes and needs to be carried out regularly. With a golf course this is seldom acceptable and so mole drainage is not often used. Nevertheless it can be effective but it only works in clay soil - where the soil will hold a channel open. It may be ideal for specific quick drainage of a wet patch. It also requires that the mole is drawn when the soil is in a suitable 'plastic' state - in contrast to aeration where the soil needs to be more friable.

In the view of Nigel, drainage is largely common sense, with most drainage runs being reasonably obvious without the need for sophisticated level sighting equipment or technical knowledge, however there are traps into which the inexperienced can fall.

Experience will also provide a quick guide to what will work, and what are the options available for the prevailing circumstances.

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